Putting the Dietary Guidelines for Americans into Action: Behavior-Directed Messages to Motivate Parents—Phase III Quantitative Message Testing and Survey Evaluation

THE 2010 DIETARY GUIDELINES for Americans (DGA)[1] and the 2008 Physical Activity Guidelines for Americans[2] provide the foundation for dietetics practitioners to communicate healthful diet, physical activity, and lifestyle messages. With two thirds of adults and one third of children overweight or obese,[3,4] recent guidance emphasizes balancing calorie intake with physical activity and selecting nutrient-dense foods. Still, many consumers struggle to achieve healthful diet and physical activity behaviors.[5-8]

Although many consumers are aware of the basic tenets of a healthful lifestyle, consistent application of diet and physical activity recommendations to daily life is not widespread. A large part of the challenge is determining what messages will inspire consumers to begin on the road to better health. Among the important factors that authors of such messages should consider include believability, ability to motivate, and likelihood to invoke action.

The Dietary Guidelines Alliance—a private–public partnership among leading food, nutrition, and health societies and industry organizations, in liaison with the US Departments of Agriculture and Health and Human Services—used a three-phase, iterative research approach to address select diet and physical behaviors. Specifically, observational ethnographies and in-depth interviews (phase I) were conducted to gain insights into current consumer behaviors and beliefs and to advise focus groups (phase II) with the goal of message development. Finally, a web-based survey of parents with children aged 2 to 17 years (phase III) was conducted to develop, refine, and validate dietary guidance messages and determine parents' intent to implement recommendations. The three-phase methodology and phases I and II findings were published in a previous article.[9] Phase III results are reported in the present article.

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PHASE III. WEB-BASED SURVEY

Phase III Purpose

The web-based survey was fielded late October through early November 2010, before the release of the 2010 DGA and MyPlate food guidance system[10] in January and June 2011, respectively. The survey tested multiple messages, developed for each of six core concepts and was informed by phase I and II findings. Phases I and II were directed at gaining insight into current consumer behaviors, beliefs, and reflections on sample messages, whereas the purpose of phase III was to validate receptivity to specific messages among parents (in general) and key subpopulations. The six concepts and corresponding behaviors were as follows:

- *Calories* (5 messages)
  - Understanding of calories' impact on weight
  - Paying attention to calories from foods and beverages during any one meal or snack
- *Physical Activity* (4 messages)
  - Being more physically active as a family
- *Energy Balance* (3 messages)
  - Making an effort to balance the amount of food and beverages the family eats and drinks with level of activity
- *Portion Size* (4 messages)
  - Paying attention to portion size and, if necessary, reducing the amount of foods and beverages served and eaten at any one meal or snack
- *Higher-calorie foods and beverages* (3 messages)
  - Managing higher-calorie food and beverage choices in a way that does not affect the family's weight
- *Nutrient-rich foods and beverages* (3 messages)
  - Serving nutrient-rich foods and beverages (such as whole grains, lean meats, low-fat dairy, fruits, and vegetables) to the family more often.

Each set of messages was evaluated for its effect on three dependent variables:

Table 1. Phase III web-based survey results: Parents' ratings/rankings for believability, motivation, and likelihood to affect behavior (dependent variables)[ab] related to core concept messages (independent variables) (n=1,000 parents)

CORE MESSAGING CONCEPT: CALORIES—Paying attention to calories from foods and beverages during any one meal or snack					
Messages Tested (Independent Variables)					
	Know Your Number	**Calories Matter Most**	**Calories Count**	**Keep Calories in Check**	**Get Curious about Calories**
	Learning how many calories you should consume in a day is a critical first step in managing your weight.	Calories are in almost everything you eat and drink and make all the difference in gaining, losing, or maintaining weight.	Calories are like a budget—you can only eat so many in a day. Spend wisely by choosing lower calorie, nutrient-rich foods most of the time to help manage your weight.	Calories are the key to achieving a healthy weight and improving health.	Calories are simply a way to measure how much fuel or energy we get from foods or beverages and how much energy we burn or use up through physical activity.
Dependent variables					
Believability[c]	**3.80±1.00**[w]	3.44±1.07[z]	3.73±1.00[wx]	3.59±0.97[y]	3.63±0.96[xy]
Likelihood to believe calories impact weight[d]	**3.43±1.41**[w]	2.82±1.39[x]	**3.27±1.31**[w]	2.83±1.29[x]	2.66±1.50[x]
Motivation[e]	**3.47±1.43**[w]	2.92±1.42[x]	**3.32±1.23**[w]	2.71±1.28[y]	2.57±1.49[y]
Likelihood to affect/implement behavior[f]	**3.79±0.95**[w]	**3.69±0.95**[w]	**3.87±0.87**[w]	**3.60±0.88**[w]	**3.64±0.90**[w]

CORE MESSAGING CONCEPT: PHYSICAL ACTIVITY—Being more physically active as a family				
Messages Tested (Independent Variables)				
	Fun Stuff Counts	**Every BODY Wins**	**Be Active Your Way**	**Get In On the Action**
	Get active with the family whether it's soccer in the backyard, dancing to music, or taking a walk in your neighborhood.	Time spent being physically active together is time well-spent. It can help your family stay connected, feel better, and have more energy.	Pick an activity everyone in the family loves and spend more time having fun together.	Show your kids how to be fit by playing actively together as often as possible.
Dependent variables				
Believability	**4.26±0.86**[w]	4.17±0.90[wx]	4.09±0.92[x]	4.07±0.92[x]
Motivation	**4.04±1.06**[w]	3.50±1.12[x]	3.34±1.02[y]	3.11±1.07[z]
Likelihood to affect/implement behavior	**4.00±0.89**[w]	**3.92±0.89**[w]	**3.95±0.85**[w]	**4.09±0.90**[w]

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Table 1. Phase III web-based survey results: Parents' ratings/rankings for believability, motivation, and likelihood to affect behavior (dependent variables)[ab] related to core concept messages (independent variables) (n=1,000 parents) *(continued)*

CORE MESSAGING CONCEPT: ENERGY BALANCE— Making an effort to balance the amount of foods and beverages your family eats and drinks with their level of activity			
Messages Tested (Independent Variables)			
	Find Your Body's Balance	**Take Charge of Your Weight**	**Maintain, Don't Gain**
	Your body weight is a balancing act between how much you eat and drink and how often you move.	Balancing the calories you eat and drink with the calories you burn through physical activity puts you in control.	Success comes from balancing how much you eat and drink with how often you move.
Dependent variables			
Believability	3.86±0.94[x]	**4.05±0.93**[w]	3.88±0.96[x]
Motivation	3.94±0.77[x]	**4.26±0.81**[w]	3.80±0.80[y]
Likelihood to affect/ implement behavior	**3.73±0.84**[w]	**3.83±0.90**[w]	**3.66±0.93**[w]

CORE MESSAGING CONCEPT: PORTION SIZE—Paying attention to portion size and, if necessary, reducing the amount of foods and beverages served and eaten at any one meal or snack				
Messages Tested (Independent Variables)				
	Personalize Portions	**Leave a Little Left Over**	**Small Steps=Big Changes**	**Savor the Small Stuff**
	Everyone's calorie needs are unique, so adjust how much you eat and drink to your personal needs.	By taking one less bite or sip every time you eat or drink, you can make a big difference in the amount you take in without feeling unsatisfied.	Serve smaller portions to help curb calories and keep your weight on the right track.	Eating and drinking smaller portions allows you to enjoy your favorite foods and beverages without having to give up anything.
Dependent variables				
Believability	3.76±1.03[x]	3.35±1.17[y]	**3.99±0.93**[w]	3.69±1.09[x]
Motivation	3.62±1.15[x]	3.15±1.09[z]	**3.91±1.00**[w]	3.32±1.08[y]
Likelihood to affect/ implement behavior	**3.86±0.90**[w]	**3.92±0.96**[w]	**3.90±0.88**[w]	**3.97±0.90**[w]

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Table 1. Phase III web-based survey results: Parents' ratings/rankings for believability, motivation, and likelihood to affect behavior (dependent variables)[ab] related to core concept messages (independent variables) (n=1,000 parents) *(continued)*

CORE MESSAGING CONCEPT: HIGHER-CALORIE FOODS AND BEVERAGES—Managing higher-calorie foods and beverages choices in a way that does not affect your family's weight			
Messages Tested (Independent Variable)			
	Ditch Deprivation	**Splurge Sensibly**	**Be a Role Model for Your Children**
	Enjoy higher-calorie foods and beverages without feeling guilty by serving smaller amounts or eating them less frequently.	Enjoy smaller amounts of the foods and drinks you love to satisfy your taste buds and avoid overdoing it.	Show your family how to savor their favorite higher-calorie foods and beverages by enjoying smaller portions together.
Dependent variables			
Believability	3.21±1.18[y]	3.69±1.05[x]	**3.96±1.04**[w]
Motivation	3.55±0.74[y]	4.08±0.68[x]	**4.37±0.80**[w]
Likelihood to affect/implement behavior	3.67±0.88[x]	3.62±0.92[x]	**4.16±0.84**[w]

CORE MESSAGING CONCEPT: NUTRIENT-RICH FOODS AND BEVERAGES—Serving nutrient-rich foods and beverages (such as whole grains, lean meats, low-fat dairy, fruits and vegetables) to your family more often			
Messages Tested (Independent Variables)			
	All Foods Can Fit into a Nutrient-Rich Eating Plan	**Base Your Plate on Nutrient-Rich Foods**	**Make the Most of Your Calories ... Maximize Nutrients**
	All foods can fit into a nutrient-rich eating plan, but balance is important. Choose lower-calorie, nutrient-rich foods first from each of the basic food groups, and then add in higher-calorie splurges as your calorie needs allow.	Base your plate on nutrient-rich foods that offer beneficial nutrients and fewer calories. Choose fruits and vegetables, whole and enriched grains, lean meats, beans and nuts and low-fat and fat-free dairy foods more often.	Make the most of your calories by choosing nutrient-rich foods and beverages first to maximize the nutrients your body needs.
Dependent variables			
Believability	3.47±1.13[y]	**4.04±0.93**[w]	3.86±0.94[x]

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Table 1. Phase III web-based survey results: Parents' ratings/rankings for believability, motivation, and likelihood to affect behavior (dependent variables)[ab] related to core concept messages (independent variables) (n=1,000 parents) *(continued)*

CORE MESSAGING CONCEPT: NUTRIENT-RICH FOODS AND BEVERAGES—Serving nutrient-rich foods and beverages (such as whole grains, lean meats, low-fat dairy, fruits and vegetables) to your family more often (*continued*)			
Messages Tested (Independent Variables)			
	All Foods Can Fit into a Nutrient-Rich Eating Plan	**Base Your Plate on Nutrient-Rich Foods**	**Make the Most of Your Calories ... Maximize Nutrients**
	All foods can fit into a nutrient-rich eating plan, but balance is important. Choose lower-calorie, nutrient-rich foods first from each of the basic food groups, and then add in higher-calorie splurges as your calorie needs allow.	Base your plate on nutrient-rich foods that offer beneficial nutrients and fewer calories. Choose fruits and vegetables, whole and enriched grains, lean meats, beans and nuts and low-fat and fat-free dairy foods more often.	Make the most of your calories by choosing nutrient-rich foods and beverages first to maximize the nutrients your body needs.
Motivation	3.86±0.83[y]	**4.18±0.81**[w]	3.95±0.78[x]
Likelihood to affect/implement behavior	3.68±0.89[x]	**3.86±0.99**[w]	3.78±0.84[wx]

[a]Values are mean±standard deviation.

[b]Boldface values are those that are ranked/rated significantly higher than the others.

[c]Believability: How would you rate each of the following messages in terms of being believable? Scale: 1="Not at all believable," 5="Extremely believable."

[d]Likelihood to believe calories impact weight: Please rank these messages from 1 to 5, where 5 is the most likely to get you to believe that calories affect weight. Results reported as mean rankings.

[e]Motivation: Please rank the following messages in terms of how likely they would be to motivate you, where 5 is the most motivating message. In the case where there are only four messages, Scale: 2="Least motivating," 5="Most motivating." In the case where there are only three messages, Scale: 3="Least motivating," 5="Most motivating." Results reported as mean rankings.

[f]Likelihood (for top motivation message only): Thinking about your daily routine, how likely is it that this message would actually get you to . . . Scale: 1="Not at all likely," 5="Extremely likely."

[wxyz]Homogenous groups are represented by the same superscript letter (w, x, y, z) and are significantly different from other groups with different letters at the $P<0.05$ level. Comparisons are made horizontally.

consumers' perceptions of message believability (believability), ability of the messages to motivate (motivation), and likelihood of the preferred message to invoke action toward a specific diet- or physical activity-related behavior (likelihood) (Table 1). Similar to prior studies,[6,11] messages were also assessed among various subgroups, including race/ethnicity (Hispanics, non-Hispanic African Americans, non-Hispanic whites); education (high school education or less); weight status of parents (families with both parents overweight/obese); and age of children (parents with children aged 2 to 5 years) (Table 2).

Phase III Approach

A US Census–balanced, nationally representative convenience sample of parents (n=1,000) with children aged 2 to 17 years was drawn from a geographically balanced national consumer panel with information on more than 300 socioeconomic, demographic, and lifestyle variables for more than 2,000,000 members. The survey sample was weighted to the 2000 US Census[12] on key variables of age, ethnicity, income, and sex. Hispanics and non-Hispanic African Americans were oversampled to improve the statistical reliability of these subpopulations and the subgroup analyses.

In the web-based survey, initial screening questions assessed whether respondents met the qualifying criterion of having children younger than 18 years, followed by demographic questions to ensure a representative sample. Then, 68 questions—using multiple-choice, rating scales, and ranking formats—were asked. For message evaluation, the order of questions and messages for each of the six core messaging concepts was rotated. Preferred information sources for diet and physical activity messaging were determined. The survey was tested on 50 subjects before fielding to ensure all questions worked correctly and survey language was clearly understood by respondents.

Descriptive statistics were performed on all variables using WinCross version 11.0, released in December 2010 by the Analytical Group, Inc. The statistical analyses were performed using SPSS, version 18.0.0, released in July 2009 by IBM.

Within each of the six core messaging concepts, a repeated measures multivariate analysis of variance (MANOVA) was conducted using the believability ratings of each message as the within-subjects factor and each of the subgroups as between-subjects factors. The MANOVA was then repeated using the motivation mean rankings of each message as the within-subjects factor and the subgroups as between-subjects factors. In addition, an analysis of variance was conducted to assess the dependent variable (likelihood) with the independent variables (preferred message and the subgroups). Each analysis tested the main effects among the messages and interactions between the messages with the various subgroups. Pairwise *t* tests with a Scheffé adjustment were conducted to determine which messages within each core messaging concept were significantly different and whether there were differences in each subgroup. The significance level was set at $P<0.05$.

Phase III Findings

Participant Demographics. The survey completion rate was 82.6% (of 1,953 respondents who started the survey, 1,615 completed it; this number includes the oversample for ethnicity). Mean time for survey completion was 18.5 minutes (standard deviation, 11.5 minutes). Those who took fewer than 5 minutes to complete the survey were excluded from the completion rate and subsequent statistical analysis (see Table 3; available online at www.andjrnl.org).

Diet and Physical Activity Perceptions and Behaviors. Parents reported their families' diets were moderately healthful (Table 4; available online at www.andjrnl.org), and their ratings of their own and their children's physical activity levels were fair and good, respectively. They also reported that increasing activity levels would have a positive impact on their overall health.

When asked to rate the importance of each core concept to the overall healthfulness of their families' diet, "serving foods and beverages that are nutrient rich" rated most important (Table 5). When asked which core area was easiest to implement consistently, 62% selected "serving nutrient-rich foods and beverages"; still, fewer than half (41%) reported doing this behavior consistently. In contrast, parents rated "paying attention to the total calories your family gets" as least important; 23% reported ease of doing so on a regular basis and only 14% did it consistently.

Testing Behavior-Directed Messages for Core Messaging Concepts

To evaluate messages in each of the six core concepts, parents went through a three-step process assessing believability, motivation, and likelihood (Table 1). The messages that tested best (or were rated/ranked the highest) for each of the outcome measures are shown in boldface in Table 1.

The main effects MANOVAs were significant ($P<0.001$) for all believability ratings and motivation mean rankings. There were no significant differences for the analysis of variance evaluating likelihood ratings ($P>0.05$) among all core messaging concepts; all messages with the highest mean ranking for motivation were equally likely to move respondents to action (likelihood). For each core concept, the main effects MANOVAs are reported followed by the results of the Scheffé adjusted *t* tests (Table 1).

Next, the subgroup MANOVA results are reported for race/ethnicity, education, weight status of parents, and age of children, followed by the results of the Scheffé adjusted *t* tests. Table 2 contains the subgroup results *only for motivation*, not for believability and likelihood. The messages that tested best (or were ranked the highest) for the subgroups are shown in boldface in Table 2.

Calories. The rating of the main believability effect of the five calorie messages was significant ($F[4, 4892]=4.98$, $P=0.001$), that is, respondents rated the messages differently. "Know Your Number" and "Calories Count" were rated as the top messages for believability ($P<0.05$) (Table 1). There was a significant interaction between the believability rating and ethnicity ($F[12, 4892]=2.51$, $P=0.003$), education ($F[4, 4892]=4.25$, $P=0.002$), families with children aged 2 to 5 years ($F[4, 4892]=3.06$, $P=0.02$), and families with two overweight or obese parents ($F[4, 4892]=2.77$, $P=0.03$). The rating pattern of these subgroups for all five mes-

sages was significantly different than the entire sample. However, non-Hispanic whites, those with a high school education or less, families with children aged 2 to 5 years, and families with two overweight or obese parents still rated "Know Your Number" and "Calories Count" as the top messages for believability ($P<0.05$). Hispanics and non-Hispanic African Americans rated all five calorie messages as equally believable (data not shown).

For the calorie concept only, a second question regarding believability was asked—specifically, "Please rank the following messages in terms of how likely they would be to get you to believe that calories impact weight?" (These data are reported as mean rankings.) The overall effect was significant ($F [4, 4937]=9.24$, $P=0.000$). "Know Your Number" and "Calories Count" were ranked significantly higher than the other three messages ($P<0.05$) (Table 1). There was a significant interaction between the messages for likelihood to believe that calories affect weight and education ($F [4, 4937]=4.02$, $P=0.003$) and families with two overweight or obese parents ($F [4, 4937]=4.14$, $P=0.003$). Those who had a high school education or less and families with two overweight or obese parents ranked "Know Your Number" highest.

The ranking of the overall motivating effect of the five calorie messages was significant ($F [4, 4812]=13.84$, $P=0.000$). For the calorie motivation rankings, "Know Your Number" and "Calories Count" ranked highest ($P<0.05$), followed by "Calories Matter Most" (Table 1). There was a significant interaction between the motivation ranking of the messages and age of children ($F [4, 4812]=4.81$, $P=0.001$). In families with children aged 6 years or older, rankings were highest for "Know Your Number," "Calories Count," and "Calories Matter Most" (data not shown).

Physical Activity. The rating of the overall believability effect of the four physical activity messages was significant ($F [3, 3784]=7.96$, $P=0.000$). "Fun Stuff Counts" and "Every BODY Wins" were rated as top messages for believability ($P<0.05$) (Table 1). There were significant interactions between believability ratings and ethnicity ($F [9, 3784]=2.55$, $P=0.006$) and education ($F [3, 3784]=3.48$, $P=0.015$). Whereas Hispanics and non-Hispanic whites rated "Fun Stuff Counts" and "Every BODY Wins" as equally believable ($P<0.05$), those with a high school education or less and non-Hispanic African Americans rated all four messages as equally believable ($P<0.05$) (data not shown).

The ranking of the overall motivating effect of the four physical activity messages was significant ($F [3, 3791]=15.33$, $P=0.000$). "Fun Stuff Counts" ranked highest followed by "Every BODY Wins" (Table 1). There were significant interactions between motivation rankings and age of children ($F [3, 3791]=4.02$, $P=0.007$), ethnicity ($F [9, 3791]=3.26$, $P=0.001$), and education ($F [3, 3791]=4.73$, $P=0.003$). Even though there were differences in the ranking patterns, families with children aged 6 years or older, non-Hispanic African Americans, non-Hispanic whites, Hispanics, and those with a high school education or less also ranked "Fun Stuff Counts" as most motivating ($P<0.05$), followed by "Every BODY Wins" (Table 2).

Energy Balance. The rating for the overall believability effect of the three energy balance messages was significant ($F [2, 2518]=8.93$, $P=0.000$). "Take Charge of Your Weight" rated highest for believability ($P<0.05$) (Table 1). There were no significant interactions between believability ratings and any of the subgroups ($P>0.05$), that is, the subgroup rating patterns were the same as the entire sample rating patterns (data not shown).

The ranking for overall motivating effect of the energy balance messages was significant ($F [2, 2528]=8.64$, $P=0.000$). "Take Charge of Your Weight" had the highest ranking for motivation ($P<0.05$) (Table 1). There were significant interactions between motivation rankings and education ($F [2, 2528]=8.99$, $P=0.000$). However, "Take Charge of Your Weight" still had the highest ranking ($P<0.05$) for those with a high school education or less (Table 2).

Portion Size. The rating of overall believability effect of the four portion size messages was significant ($F [3, 3703]=30.78$, $P=0.000$). "Small Steps=Big Changes" rated highest for believability (Table 1). There were significant interactions between believability ratings and families with two overweight or obese parents ($F [3, 3703]=6.20.78$, $P=0.000$); "Small Steps=Big Changes" and "Savor the Small Stuff" rated highest for believability (data not shown).

The ranking for overall motivating effect of each portion size message was significant, ($F [3, 3690]=24.27$, $P=0.000$). "Small Steps=Big Changes" was ranked highest for motivation (Table 1). There were no interactions between motivation ratings and any of the subgroups.

Higher-Calorie Foods and Beverages. The rating for overall believability effect of the three higher-calorie messages was significant ($F [2, 2353]=61.84$, $P=0.000$). "Be a Role Model for Your Children" rated highest for believability ($P<0.05$) (Table 1). There was a significant interaction between believability ratings and families with children aged 2 to 5 years ($F [2, 2353]=5.25$, $P=0.006$); "Be a Role Model for Your Children" also rated highest for this group ($P<0.05$) (data not shown).

The ranking for overall motivating effect of each higher-calorie message was significant ($F [2, 2444]=76.37$, $P=0.000$). "Be a Role Model for Your Children" ranked as most motivating (Table 1). There were significant interactions between motivation rankings and families with children aged 2 to 5 years ($F [2, 2444]=3.64$, $P=0.03$), ethnicity ($F [6, 2444]=4.18$, $P=0.000$), and families with two overweight or obese parents ($F [2, 2444]=3.41$, $P=0.04$). "Be a Role Model for Your Children" still ranked as most motivating for these subgroups (Table 2).

Nutrient-Rich Foods and Beverages. The rating for overall believability effect of the three nutrient-rich messages was significant ($F [2, 2181]=37.17$, $P=0.000$). "Base Your Plate on Nutrient-Rich Foods" rated highest for believability ($P<0.05$) (Table 1). There were no significant interactions between believability ratings and any of the subgroups (data not shown).

The ranking for overall motivating effect of each nutrient-rich message was significant ($F [2, 2528]=5.30$, $P=0.005$). "Base Your Plate on Nutrient-Rich Foods" was ranked as most motivating ($P<0.05$) (Table 1). There were no significant interactions

Table 2. Phase III web-based survey results: Subgroups' motivation[a] rankings (dependent variable)[bc] of core concept messages (independent variables)

CORE MESSAGING CONCEPT: CALORIES—Paying attention to calories from foods and beverages during any one meal or snack					
Motivation Ranking (Dependent Variable) of Tested Messages[d]					
	Know Your Number	**Calories Matter Most**	**Calories Count**	**Keep Calories in Check**	**Get Curious about Calories**
Subgroup[e]					
Hispanic	**3.44±1.51**^{w}	3.06±1.36^{xy}	3.13±1.20^{x}	2.84±1.34^{y}	2.53±1.48^{z}
Non-Hispanic African American	**3.56±1.42**^{w}	3.00±1.35^{xy}	3.18±1.31^{x}	2.82±1.29^{y}	2.45±1.45^{z}
Non-Hispanic White	**3.48±1.42**^{w}	2.90±1.42^{x}	**3.38±1.21**^{w}	2.70±1.27^{xy}	2.54±1.50^{y}
High school education or less	**3.48±1.49**^{w}	3.02±1.42^{x}	3.24±1.19^{wx}	2.72±1.29^{y}	2.54±1.46^{y}
Families with children aged 2-5 y	**3.49±1.47**^{w}	2.91±1.42^{x}	**3.29±1.20**^{w}	2.73±1.31^{xy}	2.58±1.46^{y}
Families with 2 overweight/obese parents	**3.60±1.44**^{w}	3.01±1.41^{x}	**3.37±1.17**^{w}	2.57±1.25^{y}	2.45±1.43^{y}

CORE MESSAGING CONCEPT: PHYSICAL ACTIVITY—Being more physically active as a family				
Motivation Ranking (Dependent Variable) of Tested Messages[d]				
	Fun Stuff Counts	**Every BODY Wins**	**Be Active Your Way**	**Get In On the Action**
Subgroups[e]				
Hispanic	**3.90±1.13**^{w}	3.53±1.13^{x}	3.35±1.02^{xy}	3.22±1.07^{y}
Non-Hispanic African American	**3.83±1.10**^{w}	3.60±1.14^{x}	3.46±1.02^{x}	3.11±1.09^{y}
Non-Hispanic White	**4.13±1.03**^{w}	3.46±1.11^{x}	3.34±1.02^{x}	3.08±1.04^{y}
High school education or less	**3.95±1.08**^{w}	3.60±1.10^{x}	3.30±1.03^{y}	3.15±1.09^{y}
Families with children aged 2-5 y	**4.05±1.06**^{w}	3.47±1.11^{x}	3.28±1.02^{xy}	3.20±1.08^{y}
Families with 2 overweight/obese parents	**4.07±1.06**^{w}	3.52±1.10^{x}	3.34±1.01^{x}	3.07±1.05^{y}

CORE MESSAGING CONCEPT: ENERGY BALANCE—Making an effort to balance the amount of foods and beverages your family eats and drinks with their level of activity			
Motivation Ranking (Dependent Variable) of Tested Messages[d]			
	Find Your Body's Balance	**Take Charge of Your Weight**	**Maintain, Don't Gain**
Subgroups[e]			
Hispanic	3.93±0.79^{x}	**4.24±0.80**^{w}	3.83±0.80^{x}
Non-Hispanic African American	3.84±0.74^{x}	**4.32±0.78**^{w}	3.83±0.83^{x}
Non-Hispanic White	3.95±0.78^{x}	**4.25±0.81**^{w}	3.80±0.80^{y}
High school education or less	3.86±0.76^{x}	**4.27±0.81**^{w}	3.87±0.81^{x}
Families with children aged 2-5 y	3.94±0.77^{x}	**4.22±0.81**^{w}	3.84±0.83^{x}
Families with 2 overweight/obese parents	3.95±0.76^{x}	4.27±0.81^{w}	3.78±0.80^{y}

CORE MESSAGING CONCEPT: PORTION SIZE—Paying attention to portion size and, if necessary, reducing the amount of foods and beverages served and eaten at any one meal or snack				
Motivation Ranking (Dependent Variable) of Tested Messages[d]				
	Personalize Portions	**Leave a Little Left Over**	**Small Steps=Big Changes**	**Savor the Small Stuff**
Subgroups[e]				
Hispanic	3.67±1.18^{x}	3.14±1.08^{y}	**3.93±0.99**^{w}	3.25±1.03^{y}

(continued on next page)

Table 2. Phase III web-based survey results: Subgroups' motivation[a] rankings (dependent variable)[bc] of core concept messages (independent variables) *(continued)*

CORE MESSAGING CONCEPT: PORTION SIZE—Paying attention to portion size and, if necessary, reducing the amount of foods and beverages served and eaten at any one meal or snack (*continued*)				
Motivation Ranking (Dependent Variable) of Tested Messages[d]				
	Personalize Portions	**Leave a Little Left Over**	**Small Steps=Big Changes**	**Savor the Small Stuff**
Non-Hispanic African American	3.68±1.14^{x}	3.21±1.12^{y}	**3.99±0.95^{w}**	3.12±1.02^{y}
Non-Hispanic White	3.59±1.14^{x}	3.11±1.08^{z}	**3.92±1.00^{w}**	3.39±1.08^{y}
High school education or less	3.61±1.14^{x}	3.15±1.08^{y}	**3.93±1.03^{w}**	3.31±1.07^{y}
Families with children aged 2-5 y	3.63±1.13^{x}	3.17±1.07^{y}	**3.91±1.01^{w}**	3.28±1.10^{y}
Families with 2 overweight/obese parents	3.54±1.18^{x}	3.19±1.06^{y}	**3.94±1.03^{w}**	3.33±1.06^{xy}

CORE MESSAGING CONCEPT: HIGHER-CALORIE FOODS AND BEVERAGES—Managing higher-calorie foods and beverages choices in a way that does not affect your family's weight			
Motivation Ranking (Dependent Variable) of Tested Messages[d]			
	Ditch Deprivation	**Splurge Sensibly**	**Be a Role Model for Your Children**
Subgroups[e]			
Hispanic	3.54±0.73^{y}	4.07±0.67^{x}	**4.39±0.80^{w}**
Non-Hispanic African American	3.58±0.75^{y}	3.99±0.70^{x}	**4.42±0.77^{w}**
Non-Hispanic White	3.58±0.76^{y}	4.11±0.68^{x}	**4.31±0.82^{w}**
High school education or less	3.56±0.73^{y}	4.10±0.70^{x}	**4.35±0.80^{w}**
Families with children aged 2-5 y	3.54±0.74^{y}	4.02±0.68^{x}	**4.43±0.78^{w}**
Families with 2 overweight/obese parents	3.55±0.74^{y}	4.13±0.67^{x}	**4.33±0.82^{w}**

CORE MESSAGING CONCEPT: NUTRIENT-RICH FOODS AND BEVERAGES—Serving nutrient-rich foods and beverages (such as whole grains, lean meats, low-fat dairy, fruits and vegetables) to your family more often			
Motivation Ranking (Dependent Variable) of Tested Messages[d]			
	All Foods Can Fit into a Nutrient-Rich Eating Plan	**Base Your Plate on Nutrient-Rich Foods**	**Make the Most of Your Calories . . . Maximize Nutrients**
Subgroups[e]			
Hispanic	3.89±0.81^{x}	**4.24±0.81^{w}**	3.88±0.78^{x}
Non-Hispanic African American	3.82±0.82^{x}	**4.24±0.80^{w}**	3.94±0.77^{x}
Non-Hispanic White	3.89±0.83^{x}	**4.15±0.81^{w}**	3.96±0.78^{x}
High school education or less (n=459)	3.87±0.82^{x}	**4.17±0.83^{w}**	3.96±0.78^{x}
Families with children aged 2-5 y	3.88±0.85^{x}	**4.19±0.82^{w}**	3.93±0.75^{x}
Families with 2 overweight/obese parents	3.88±0.85^{x}	**4.14±0.80^{w}**	3.98±0.78^{x}

[a]Motivation: Please rank the following messages in terms of how likely they would be to motivate you, where 5 is the most motivating message. In the case where there are only four messages, Scale: 2="Least motivating," 5="Most motivating." In the case where there are only three messages, Scale: 3="Least motivating," 5="Most motivating." Results reported are mean rankings.

[b]Values are mean±standard deviation.

[c]Boldface values are those that are ranked significantly higher than the other values.

[d]See Table 1 for complete messages.

[e]Subgroup sample size: Hispanic 451; Non-Hispanic African American 437; Non-Hispanic White 685; High school education or less 459; Families with children aged 2-5 years 370; Families with 2 overweight/obese parents 338.

[wxyz]Homogenous groups are represented by the same superscript letter (w, x, y, and z) and are significantly different from other groups with different letters at $P<0.05$. Comparisons are made horizontally.

Table 5. Phase III web-based survey results: Perceived importance and ease of implementation of core messaging concepts and reported corresponding behaviors of respondents to determine and prioritize motivating dietary guidance messaging for parents with children aged 2 to 17 years (n=1,000 parents)

	In general, how important, if at all, do you think each of the following concepts could be to the overall healthfulness of your family's diet?	Rank the following concepts in terms of how easy they are (or would be) for your family to do on a regular basis.	Is your family currently doing any of the following?	
Core messaging concepts and corresponding behaviors	Overall mean±SD[ab]	Ranked first or second[c] (%)	Consistently (%)	Somewhat consistently (%)
Paying attention to the **total calories** your family gets from foods and beverages during any one meal or snack	3.55 ± 1.15[z]	23	14	48
Making an effort to **balance the amount of foods and beverages** your family eats and drinks **with** their **level of activity**[d]	4.06±0.93[y]	37	26	56
Paying attention to the **amount of foods and beverages** served and eaten during any one meal or snack	3.93±1.01[y]	54	32	54
Managing **higher-calorie foods and beverages** choices in a way that does not affect your family's weight	3.93±1.03[y]	25	20	58
Serving **foods and beverages that are nutrient-rich** (such as whole grains, lean meats, low-fat dairy, and fruits and vegetables) more often	4.32±0.89[x]	62	41	51

[a]SD=standard deviation.

[b]Scale: 1="Not at all important," 5="Extremely important."

[c]Ranking scale: 1=easiest, 5=hardest.

[d]Physical activity was tested as a component of this concept.

[xyz]Homogeneous groups are represented by the same superscript letter (w, x, y, and z) and are significantly different from other groups with different letters at the 95% level. Comparisons are made vertically.

between motivation ratings and any of the subgroups (Table 2).

Delivery of Messages

When asked to choose one preferred source of information for each core concept, parents' top-rated sources for messaging were grocery stores, health professionals' offices, and restaurants (Table 6; available online at www.andjrnl.org).

INTERPRETING THE WEB SURVEY FINDINGS

The web-based survey results indicate behavior-directed messaging may motivate consumers to action.

Diet and Physical Activity Perceptions and Behaviors

Perceptions of surveyed core messaging concepts indicated calories were not as important relative to nutrient-rich foods, which respondents perceived as most important. This finding held true for respondents' self-reported behaviors and their perceptions of ease of implementation. Still, most consumers were not consistently implementing any of the core behaviors tested.

Behavior-Directed Messages for Core Concepts

Calories. Given the DGA's emphasis on achieving calorie balance, improving parents' understanding of calories and their role in weight management is a crucial step. Research suggests there is an opportunity to decrease consumers' "calorie confusion."[7] The "Calories Count" message may be critical in helping consumers recognize the role calories play in weight management.

Prominence of calorie information on food labels,[13] front-of-package labeling efforts,[14] and requirements for calorie content on menus[15] may increase Americans' awareness of the calorie content in their most commonly consumed foods and beverages. Such information may help consumers track how many calories they consume generally; nevertheless, previous research indicates most consumers would be unwilling to count calories with great detail.[7,9,16]

To effectively maximize emerging policies and programs providing calorie information, messages that contextualize consumers' personal caloric energy needs or total day's food and beverage intake are likely needed. "Know Your Number" may be a key message for inclusion in labeling education campaigns. Similar messaging campaigns for knowing cholesterol levels (such as a program also called "Know Your Number") have been helpful for increasing awareness of blood cholesterol and its relationship to heart disease.[17] Knowing one's personal calorie number—that is, a total day's energy needs—may be helpful in understanding the context of label information, making balanced choices, and, ultimately, managing weight. Recently, US Department of Agriculture's SuperTracker diet and physical activity planner added a new feature that allows users to set personal calorie targets based on weight management goals.[18]

Physical Activity. "Fun Stuff Counts" motivated parents and provided specific information and ideas, emphasizing family exercise. "Every BODY Wins" closely followed "Fun Stuff Counts" and emphasized family time. The family dynamic has been shown to influence healthful eating[19] and physical activity[20,21] behaviors. Children's self-efficacy for and level of physical activity are affected by perceived parental support of, positive attitudes toward, and modeling of physical activity behaviors.[22] Messages that target parental support by encouraging parents to act as role models may promote increased activity levels among all family members.

Energy Balance. Focus group findings[9] showed consumers had initial difficulty grasping the term "energy balance," which has been observed in previous studies.[16,23,24] However, a detailed message about what energy balance entails—"Take Charge of Your Weight: Balancing the calories you eat and drink with the calories you burn through physical activity puts you in control"—was considered most believable and motivating by participants. Recognition of both components of energy balance—calories consumed and calories expended through physical activity—is key to this concept's success. Therefore, calorie, physical activity, and energy balance messaging should likely be used to complement each other when communicating this concept to the public.

Portion Size. For portion size, "Small Steps=Big Changes" was most believable and motivating to participants. This message provided practicality and specifics and tied into weight: "Serve smaller portions to curb calories and keep your weight on the right track." In phase II focus groups for this study,[9] as well as in other studies,[25,26] most parents said they did not know how much food they or their children should be eating and they wanted to learn about age-appropriate portions. Early interventions with parents and/or children may be an important time to initiate portion awareness and mindful eating.[27]

Higher-Calorie Foods and Beverages. Leading by example, "Be a Role Model for Your Children," was identified by participants as the most believable and motivating message for incorporating higher-calorie foods and beverages into the family's diet. Although parents desire to be role models, they may be discouraged by messaging that implies they are doing something "wrong" and may elicit defensive reactions. Messages should focus on how parents can do something positive, providing specific role model behaviors to empower and reassure them.[28]

Nutrient-Rich Foods and Beverages. Although participants named at least one example of a nutrient-rich food in phase II, many indicated they would benefit from practical education regarding which foods are nutrient rich and how to incorporate more into their diets.[9] Interestingly, despite being tested before the release of the US Department of Agriculture's MyPlate food guidance system and message platform, the most believable and motivating message was—"Base your plate on nutrient-rich foods that offer beneficial nutrients and fewer calories. Choose fruits and vegetables, whole and enriched grains, lean meats, beans, and nuts and low-fat and fat-free dairy foods more often." This message could easily be adapted for or integrated into a national campaign, as it directly reinforces MyPlate and corresponding messages.[10,29] Importantly, a recent study demonstrated that education on build-

ing healthful diets by identifying and choosing more nutrient-rich foods improved participants' diet quality.[30]

Preferred Sources of Information

The grocery store was a highly rated source where consumers would most likely pay attention to information about all core concepts tested. The health professional's office was rated highly for information regarding the impact of calories on weight, portion size, and energy balance. Restaurants were rated highly for information about portion size and higher-calorie items. These findings, in addition to driving trends,[31] point to significant opportunities for food and nutrition practitioners in various settings to prioritize communication regarding these concepts.

Limitations

The web-based survey was a cross-sectional study and measured consumers' reactions at one point in time.

IMPLICATIONS FOR RESEARCH AND PRACTICE

Behavior-directed and consumer-tested message development has an important place in nutrition, physical activity, and health promotion.[32] The Dietary Guidelines Alliance's three-phase, iterative research process, which used qualitative (ethnographies and focus groups) and quantitative (web-based survey) studies, illustrates one approach for designing and testing a variety of messages that are complementary to and consistent with the DGA. These messages are additional tools that dietetic practitioners can use as they assist consumers in achieving dietary and physical activity recommendations.

Phase I ethnographies and in-depth interviews and phase II focus group studies revealed that parents were generally not familiar with some basic diet and physical activity concepts, such as calories and energy balance.[9] Therefore, the tested messages were simple and did not assume prior or in-depth knowledge of principles related to nutrition or physical activity. Recognizing that parents value family involvement and individualized solutions, resulting messages—such as "Be a Role Model for Your Children" and "Know Your Number"—were highly rated by participants.

Multiple sectors of society are influential in helping consumers make healthful diet and physical activity choices to meet recommendations.[1,24,33] Societal trends, such as increasing diversity and global communications, affect how the dietetics profession develops and disseminates messages.[34] Consideration of influential factors—such as lifestyle priorities, cultural norms, and values—is critical when developing consumer messages, whether they are to be used as part of a communication campaign or used for one-on-one patient counseling sessions. Previous efforts to communicate the DGA and Physical Activity Guidelines for Americans illustrate the need for improvement and require a coordinated, multi-sector approach targeting the needs of specific populations.[35]

Messages should be clear, simple, upbeat, and focused on specific actions that help consumers achieve guidance recommendations.[32,35,36] The messages tested in this study provide a research-based framework to motivate US families toward implementing behaviors consistent with diet and physical activity guidance. Messages ranked most motivating can be integrated by dietetics practitioners into their practices, programs, and interventions. When applied in a practitioner setting, the use of these messages also requires evaluating clients' individual knowledge, comprehension, values, and motivators. Once messages are integrated into education programs and materials, they should be evaluated to assess their impact on behavior change.

This research suggests that health and nutrition experts, dietetics practitioners, policy makers, and public health professionals alike can use both scientific and consumer research in developing effective behavior-directed approaches to change the trajectory of Americans' health.

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Table 3. Demographic characteristics of phase III Census-balanced web-based survey respondents (n=1,000 parents) to determine motivating dietary guidance messaging for parents of children aged 2 to 17 years

Characteristic variable	Web-based respondents n (%)
Sex	
Male	402 (40)
Female	598 (60)
Age of parent (y)[a]	
18-34	330 (33)
35-54	626 (63)
55+	44 (4)
Overweight/obese[a]	
No parents	201 (20)
One parent	461 (46)
Two parents	338 (34)
Ethnic background	
Non-Hispanic white	685 (68)
Non-Hispanic African American	126 (13)
Hispanic	148 (15)
Other	40 (4)
Marital status	
Single	144 (14)
Married/living with partner	745 (75)
Divorced	83 (8)
Widowed	12 (1)
Other	14 (2)
Employment	
Employed full-time	568 (57)
Employed part-time	122 (12)
Not currently employed outside home	239 (24)
Other	70 (7)
Education	
High school or less	459 (46)
Some college/college graduate	453 (45)
Graduate/professional school	88 (9)
Annual household income ($)	
<35,000	275 (27)
35,000-49,999	146 (15)
50,000-74,999	229 (23)
75,000-99,999	165 (17)
≥100,000	185 (18)
Region in United States	
Northeast	180 (18)
Midwest	218 (22)
South	368 (37)
West	234 (23)
Number of children in household	
1	438 (44)
2	369 (37)
3	135 (13)
4+	48 (6)
Age of children (y)[b]	
0-1	0 (0)
2-5	369 (37)
6-9	337 (34)
10-12	290 (29)
13-17	473 (47)

[a]Body mass index calculated from self-reported weights and heights and categorized according to Centers for Disease Control and Prevention standards. http://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html. Accessed March 29, 2012.
[b]Multiple responses allowed.

Table 4. Phase III web-based survey results: Parents' self-reported perceptions of their family's current diet and physical activity behaviors (n=1,000 parents)

Questions	Overall mean±SD[a]
How would you rate the healthfulness of your family's diet? By "diet," we mean everything your family consumes, including foods, beverages, and dietary supplements. Scale: 1="Not at all healthful," 5="Extremely healthful"	3.20±0.76
How would you rate your personal level of physical activity over the course of an average week? Scale: 1="Poor," 2="Fair," 3="Good," 4="Very good"	2.32±0.85
How would you rate your children's level of physical activity over the course of an average week? Scale: 1="Poor," 2="Fair," 3="Good," 4="Very good"	2.98±0.80
How much of an impact, if any, do you think increasing your activity level during the course of your everyday routine would have on your overall health? Scale: 1="No impact," 5="Great impact"	3.99±1.01

[a]SD=standard deviation.

Table 6. Phase III web-based survey results: Top-rated sources by percentage for information related to core messaging concepts tested (n=1,000 parents)[a]

Where do you think you would be most likely to pay attention to information about each of the following things? Check ONE for each area.

Core Messaging Concepts	Information Sources (%)							
	Grocery store	Health care provider's office	Restaurant	Internet	TV	Gym	Mobile phone	Materials from school
Calories The relationship between calories and weight	22	23	13	12	12	13	2	4
Energy balance[b] How balancing the amount your family eats and drinks with their level of activity improves health	24	18	8	11	18	12	1	7
Portion size The amount you and your kids should be eating and drinking	22	23	17	10	12	2	1	11
Higher-calorie foods and beverages Fitting higher-calorie foods and beverages into your family's diet in a sensible way	30	13	20	11	15	4	1	5
Nutrient-rich foods and beverages Getting more nutrient-rich foods and beverages into your family's diet	53	11	8	8	11	2	2	5

[a]Information can be used by dietitians in various practice settings to prioritize specific dietary guidance concepts and educational outreach.
[b]Physical activity was included as a component of this concept.